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paper closes with an interesting discussion of the significance of the reduction of chromosomes and its relation to alternation of generations.—CHARLES J. CHAMBERLAIN.

Legume inoculation.—KELLERMAN and ROBINSON²⁴ have been investigating the conditions under which a particular species of legume might be successfully inoculated, and the conditions under which failure to obtain inoculation might be expected. A summary of the results is as follows: lime is of decided benefit in obtaining successful inoculations of legumes in some soils (often showing an acid reaction to litmus); soil extracts serving as culture media often indicate the probable success of inoculating a leguminous crop; at least during the first season's growth no general cross-inoculation takes place (bacteria from one host, however, may inoculate a physiologically related species); heavy inoculation by a pure culture increases nodule formation if the soil solution is enriched by the excess of culture medium (in a favorable soil, however, a light inoculation well-distributed is as effective); thorough aeration is favorable to nodule formation.—J. M. C.

Rate of growth of "fairy rings."—In view of the fact that little is known of the length of the life cycle of most of the Basidiomycetes, an observation of THOMAS²⁵ on *Hydnellum suaveolens* is of interest. This fungus forms "fairy rings" in forests. Such a ring was observed by THOMAS in 1896, and at that time the radius of the circle was 8.41^m. The sporophores of the fungus appeared irregularly during the following years, but at no time did those of *H. suaveolens* appear within the circular area once occupied by the mycelium of that fungus. In the years 1901, 1902, and 1905 it was again possible to make radial measurements, when the radius of the circle was 9.54^m, 9.92^m, and 10.56^m, respectively. From the annual increase thus obtained the calculated age of the circle was about 45 years. For nearly half a century the mycelium had grown, spreading over the area of a fairy ring scarcely 20^m in diameter.—H. HASSELBRING.

Seedlings of gymnosperms.—HILL and FRAINE have been studying the anatomy of the seedlings of Coniferales, and an abstract of their paper has been published.²⁶ The general conclusions are that the cotyledonary bundles of *Cephalotaxus* and *Taxus* exhibit mesarch structure; that the gymnosperms as a whole exhibit three varieties of rotation, namely (1) that in which the cotyledonary bundle is endarch throughout and the rotation of the protoxylem is very indefinite (as *Cephalotaxus*), (2) that in which the cotyledon-trace is endarch but the rotation of the protoxylem takes place in the hypocotyl (as *Cedrus*),

²⁴ KELLERMAN, KARL F., and ROBINSON, T. R., Conditions affecting legume inoculation. U. S. Dept. Agric., Bur. Pl. Ind., Bull. 100, part viii. pp. 15. pls. 2. 1906.

²⁵ THOMAS, FR., Die Wachstumsgeschwindigkeit eines Pilzkreises von *Hydnellum suaveolens* Scop. Ber. Deutsch. Bot. Gesells. 23:476-478. 1906.

²⁶ HILL, T. G., and FRAINE, E. DE, On the seedling structure of gymnosperms. Annals of Botany 20:471-473. 1906.

and (3) that in which the rotation of the xylem and bifurcation of the phloem of the cotyledonary bundle take place in the cotyledon (as *Pinus*); and that the numerous cotyledons obtaining in many plants have been formed by the splitting of the preexisting ones.—J. M. C.

Plant formations at Victoria Falls.—Miss GIBBS²⁷ has published an enumeration of the plants collected in two localities in southern Rhodesia during a period of three months. The list is a long one, and the new species are numerous. A second part of the paper describes the plant formations in the vicinity of Victoria Falls, three distinct regions being recognized: (1) The veldt, or open forest growth, which is found throughout southern Rhodesia, extending on both sides of the Zambesi River as far as the eye can see; (2) a region limited to the immediate banks of the Zambesi and the islands above Victoria Falls, in which *Eugenia guineensis* is dominant; (3) a region including the bog edge of Livingstone Island and that of the rainy forest in general, dominated by *Eugenia cordata*. The four plates reproduce eight photographs of characteristic plants and plant formations.—J. M. C.

Aluminum in soil and water cultures.—ROTHERT²⁸ gives in preliminary form the work done by his pupils on the general relation of plants to aluminum.²⁸ The soluble salts of this metal and also to some extent the insoluble phosphates will enter the plant from soil and water cultures. Entrance to the plant occurs much more readily from the water than from the soil cultures. After entering the roots the solutes do not migrate to other tissues but accumulate in the tissues of the root, so that on analysis nearly all and in some cases all of the metal found is in the roots. Very dilute solutions were found to stimulate growth, while the more concentrated ones were toxic.—RAYMOND H. POND.

Conifers of China.—MASTERS²⁹ has enumerated the conifers of China, which is of special interest since the China-Japan region contains more endemic genera of conifers than any other. The 89 species recognized are distributed among 21 genera as follows: *Podocarpus* (7), *Dacrydium*, *Cephalotaxus* (6), *Torreya* (2), *Taxus*, *Pinus* (14, with 2 new species), *Larix* (7), *Pseudolarix*, *Picea* (15, with 3 new species), *Tsuga* (5), *Pseudotsuga*, *Keteleeria* (4), *Abies* (8, with a new species), *Cunninghamia*, *Taiwania*, *Cryptomeria*, *Glyptostrobus*, *Libocedrus*, *Thuja* (2), *Cupressus* (3), *Juniperus* (7).—J. M. C.

Freezing.—What kills a plant when it freezes? Various answers have been made to this question, the current one (PFEFFER, JOST) being that death is due

²⁷ GIBBS, Miss L. S., A contribution to the botany of southern Rhodesia. *Jour. Linn. Soc. Bot.* **37**: 425-494. *pls. 17-20.* 1906.

²⁸ ROTHERT, W., Das Verhalten der Pflanzen gegenüber dem Aluminium. (Vor. Ber.) *Bot. Zeit.* **64**: 43-52. 1906.

²⁹ MASTERS, MAXWELL T., On the conifers of China. *Jour. Linn. Soc. Bot.* **37**: 410-424. 1906.